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## Journal of the Society of Arts.

FRIDAY, OCTOBER 23, 1863.

### ELECTION OF THE PRINCE OF WALES AS PRESIDENT.

A General Meeting of the members of the Society was held on Thursday, the 22nd instant, at 4 o'clock. The members assembled at Burlington House, as the Society's House in the Adelphi is at present undergoing repairs.

WILLIAM HAWES, Esq., F.G.S., the Chairman of the Council, occupied the Chair.

The SECRETARY having read the notice convening the meeting,

The CHAIRMAN said:—I will commence the proceedings of this meeting by calling your attention to the fact that, at the first annual meeting of the Society after the lamented death of the Prince Consort, it was stated in the Council's report that we hoped to have the honour and advantage of the Presidency of His Royal Highness the Prince of Wales, so soon as a fitting time had elapsed since the death of his father. In the interval we elected as our President one of our oldest and most respected Vice-Presidents, Mr. William Tooke, and he filled the office until recently, when by his death it became vacant. We then thought it right to take steps for ascertaining whether the Prince of Wales would accept the Presidency, if elected by the members; we therefore sought for and obtained the honour of an interview with His Royal Highness, and presented an address, which, with His Royal Highness's reply, I will now read to you:—

To HIS ROYAL HIGHNESS THE PRINCE OF WALES.

MAY IT PLEASE YOUR ROYAL HIGHNESS,

We, the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, humbly approach your Royal Highness, to ask that you will be graciously pleased to become a Member of the Society, with the view of being elected to the office of its President.

The Council can never forget the obligations of the Society to your illustrious father, who, for a period of eighteen years, presided over its proceedings with so much advantage, not only to the Society but to the country at large.

The establishment of International Exhibitions, and the comprehensive designs for connecting education in Science and Art with productive industry, were among the many thoughtful endeavours of His Royal Highness to promote the welfare of his adopted country.

The Council believe that your acceptance of this office will be a means of enabling your Royal Highness to pro-

mote and extend the enlightened views of your lamented father for the advancement of Arts and Manufactures, and the benefit of Her Majesty's subjects.

On behalf of the Council,  
WILLIAM HAWES, Chairman.

His Royal Highness was graciously pleased to return the following reply:—

GENTLEMEN,—I thank you for your address. It is not without much diffidence that I venture to take on myself the office that has been offered to me in so flattering a manner, feeling that there are so many better qualified for it than I can pretend to be.

But it is the Queen's wish, being herself precluded from taking part personally in the proceedings of your Society, to mark, through me, the interest she feels in a body of which her beloved husband was so long the head.

On my own part, I am led to entertain the hope that, by accepting the situation of your President, I may be better able to promote the great and beneficent objects which my dear father had so much at heart, and in which he was so zealously supported by your Society.

Encouraged by this hope, and having no dearer wish than to assist in any way in my power towards the success of his great designs, I cannot refuse to accept the position so kindly offered to me.

I am sure you will all feel that the terms in which His Royal Highness has expressed the feelings of Her Majesty, as well as his own, towards this Society, are most gratifying. We cannot see the son of so distinguished and illustrious a parent succeed to the chair which the Prince Consort filled with so much distinction and so much usefulness, without looking back to the progress of the Society, and recalling to mind the various Presidents who have preceded him. We have had the honour of being presided over in succession by members of the Royal Family. His Royal Highness the Duke of Sussex was for many years President, and during his presidency the Prince Consort was Vice-President. He succeeded to the chair at the death of the Duke of Sussex. And now, having unfortunately lost this illustrious Prince, who presided over us for so long a period, we have come here to elect as his successor a young man, comparatively untried, but whose education has been such that we have every reason to believe that he inherits from his father the same desire to do good to the working classes of this country, the same desire to

promote the encouragement of art in connection with manufactures, and the same anxiety to make himself really useful, and to follow in the footsteps of his father as an earnest promoter of Arts, Science, and Literature; and we hope that, some years hence, we shall be as proud of his Presidency as I believe we all are of the Presidency of his illustrious father.

Immediately upon receiving His Royal Highness's answer, the Council summoned this meeting. By the ordinary rules of the Society, before a member can be elected he must be proposed, and his name suspended for a certain period. We felt sure that you would agree with us, that to pass His Royal Highness through such an ordeal as that, after the answer I have just read to you, would not be respectful to him, or in accordance with your feelings. We therefore thought it right to call you together, and ask you at once to suspend all the bye-laws relating to the election of members and officers, and to submit his name to you to be at once elected a member of the Society. Having done that it will be my duty to bring forward another proposition, that he be elected our President. In that, again, the Council, bearing in mind the feelings of all the members as well as their own, did not consider they would be doing their duty if they used the powers given to them by the bye-laws to elect a President till the next Annual Meeting. They, therefore, thought it due to you that you should exercise your power, that the whole body of members should have an opportunity of expressing how cordially they appreciate the very kind and flattering terms used by His Royal Highness in the reply which I have just read, and also the gratitude we owe to Her Majesty for her gracious expression of sympathy with the proceedings of this Society. The first step to be taken is the purely formal one of suspending for this occasion the bye-laws relating to the election of members and officers. I will therefore propose :—

" That the bye-laws relating to the election of members and officers be suspended for this meeting."

This having been unanimously passed,

The CHAIRMAN proposed :—

" That His Royal Highness the Prince of Wales be elected a member of this Society."

This resolution having also been passed unanimously,

The CHAIRMAN said he would next propose :—

" That His Royal Highness the Prince of Wales be elected President of this Society."

This was passed by acclamation.

A vote of thanks to the chairman was then proposed by Mr. JOSEPH PAYNE, seconded by Mr. TEULON, and carried unanimously.

#### THE WATCH TRADE OF GENEVA.\*

It is a matter of some interest to inquire whether the manufacture of watches in Geneva is likely to remain in its present state of depression, or whether, from certain

causes to which it has been subject for a time, this depression will disappear with the unfavourable circumstances which caused it.

It would be almost impossible for any person unconnected with watch-making to arrive at a correct view of the case, viz., of the great amount of industry, and of the vast quantity of watches which are annually manufactured in Geneva. The difficulty arises from various causes, but chiefly from this, that it is not imperative to have the Government stamp engraved on each watch. This mode of testing the exact number of watches made in the city would, therefore, prove erroneous, and, even if obtained, would not be satisfactory, as a good many case-makers and engravers work for Neuchâtel, where they send their unfinished watches, which claim afterwards no other origin but that of Geneva, though they may have no right to it.

The result of any inquiries made at the office of the public taxes would be equally fallacious, as it is not likely that the real number of watches made is ever stated by the makers.

The only way of getting as near the truth as possible is by basing your calculations upon certain data current among the manufacturers themselves, and knowing the number of watches which some of them produce annually, and the number of workmen employed by others. You may thus arrive at the total number of watches manufactured, which, though not an easy task, may still be achieved by anyone thoroughly versed in the matter, and not afraid of tedious researches.

It should be observed that in such an inquiry great care must be taken not to mistake for Geneva manufacture the goods sold by those manufacturers who get all their watches from Neuchâtel, a practice by no means uncommon. The city of Geneva does not manufacture one-fifth part of the watches which are manufactured in the Canton of Neuchâtel; the small city of Chaux-de-Fonds alone (whose inhabitants are all watchmakers), yearly makes twice as many watches as Geneva does.

After the political events which disturbed all Europe in 1848, the trade of watch-making was thoroughly paralysed in Geneva, and seemed, for some time, past revival. Money and credit were equally wanting, and the workmen employed before that time in the great manufactories became so utterly destitute that they were nearly driven to desperation.

The Government took every measure in their power to ameliorate this alarming state of things, and, seeing the utter hopelessness of trying to revive this particular branch of industry, for which there was at the time no market, they created the national "chantiers," where every citizen could find a retreat against starvation by becoming carpenters, roadmakers, hedgers or ditchers, &c. These national "chantiers" gave work to an immense number of hands during two years. In 1850 they were reduced in number, from the fact that the trade of watch-making appeared to revive in some degree. The greater part of the manufacturers re-opened their workshops, but they set to work with extreme circumspection, the political horizon being still very far from encouraging. It was then that the evil results of what had been for the time a means of salvation became evident. Those men who had left their quiet and comparatively easy work, to take to the trowel and spade for a certain length of time, and who, during that time, had, for the greater part, adopted the loose habits of common labourers, had become totally unfit for their former trade; some had lost the taste, some the neatness of hand required for such work, and all were dissatisfied. It is supposed that the city of Geneva did not issue more than 30,000 watches in the year 1850.

In 1851 the London Exhibition gave new vigour to this industry. The workmen took heart, and an immense number of watches were made; fresh markets were opened; North and South America offered a vast field to traders; watches were sent from Geneva to all parts of

\* This information has been furnished by one of the Geneva watch-makers.

Europe and elsewhere: Russia, Turkey, Egypt, were inundated by them, as well as India. Not less than 60,000 watches were manufactured in Geneva in the year 1851.

The years 1852 and 1853 were similar to 1851, with this difference, that the markets of North America having become more and more extensive, and their demands for watches more and more important, the Genevese manufacturers threw themselves wildly upon these new hopes, increasing the extent of their trade to irrational limits, and sending their goods to America in enormous quantities. And it is to be observed that the goods thus sent were not only those that American merchants bought or ordered, but were goods sent conditionally to commissioners of whose respectability or solvency nothing whatever was known to the manufacturers, who risked sometimes their whole fortune on such frail probabilities of payment. Numberless agents started up in the principal cities of North America—New York, Boston, Philadelphia, New Orleans, and even San Francisco had their agents, whose demands for watches were unlimited and extravagant.

As happens in everything of the same kind, these first years of success brightened the hopes of all manufacturers, and everyone seemed to believe that a new era was beginning for the prosperity, not only of Geneva, but of all those cities of Switzerland whose chief trade lies in watch-making. In 1855 an enormous number of watches were made and new agents set up in Paris and elsewhere, as they had done in America.

We may here state that during the disastrous years 1848-51, public banks had been created, with a view of affording accommodation on easier terms to those manufacturers who wanted funds. Among these establishments were, the Bank of Geneva, the Caisse d'Escompte, the Swiss Bank, &c., which principally supported watchmakers; but, unfortunately, the Caisse d'Escompte, on which the manufacturers had built their greatest hopes of renewed prosperity, soon became their ruin. The mode of payment between manufacturers and workmen underwent a gradual change; payments were no longer made in cash; bills and drafts were circulated to an enormous amount, and the meanest workman had an account opened in the Swiss bank, or the Caisse d'Escompte, where he could negotiate his bills.

The Crimean war was beginning to tell in the shape of scarcity of money and scarcity of demands for watches from the East. Goods were sent off to the American agents more rashly than ever; and some manufacturers even had recourse to the mode of having their conditional accounts with these agents negotiated in public banks, at whatever loss to themselves, as long as they could find ready money to get out of their entangled affairs.

The years 1856-57 passed in much the same manner; but the "Caisse d'Escompte," which had seemed to rise above the other banks, suddenly stopped its payments; a great number of manufacturers became, consequently, embarrassed, others insolvent, and all their hopes turned again, though in a less degree, towards America and Italy. Geneva and Neuchâtel were struggling against each other for the sale of their watches; Neuchâtel lowered its price, and shortly afterwards they sank so low that Neuchâtel watches were to be bought in New York for only 5 francs more than they had cost to the maker.

The "Comptoir d'Escompte" seemed for a time to replace advantageously the "Caisse d'Escompte," but again this assistance was of short duration; a great number of manufacturers were beginning to slacken their way of working—some, out of straitened circumstances; others, out of tardy prudence. America paid badly, and yet goods were still rashly sent to all its markets.

In 1858-59, the Italian war did much injury to Geneva. American payments became still less certain. Amongst the manufacturers very few were able to obtain money on their bills from public banks; a great many tried to sell off their stock, but that had become impossible.

At Neuchâtel other means of rescue were tried. The "Union Horologère" was created, and a Society for the Exportation of Watches, both of which had agents in every city of Europe, in China, in India, in America, and, in fact, all over the world. These associations sold watches at such reduced prices that it was impossible to compete with them, inasmuch as the laws of Geneva forbid the sale of any watches whose gold is not in proportion of  $\frac{15}{16}$ , or 18 carats; whereas in other cities of Switzerland gold may be worked in an unlimited proportion to other metals, as no legal control is placed over it, and consequently at much less cost, though, of course, with a proportionate inferiority.

In 1859, work was slackened to nearly the half of the preceding years; in 1860, it did not come up to the third of the same amount; and in that same year, 1860, the creation of the "warrants" struck a deadly blow at a great portion of the Geneva manufacturers. In 1861 this state of things continued. A great number of shops—engravers', case-makers', &c.,—were compelled to close their doors and pay off their workmen. This was principally the case with those firms who worked for Neuchâtel.

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To sum up it may be stated that the great facility offered for procuring money has been the ruin of many Genevese watchmakers. The illusory help they found in these deceitful transactions affected others equally; the encumbrances were only displaced, but not removed; and this fallacious security tempted them out of the limits of all prudence to launch them into the most hazardous speculations. All the great markets are overflowing with Geneva watches. In London, New York, Paris, Constantinople, Odessa, St. Petersburg, Swiss watches may be bought for less than their original cost to the maker; and during a certain period good watches have been sold in New York at half-price, and even for their weight of gold.

After having thus stated the lamentable decrease in its prosperity under which Geneva has been and is still labouring, let us proclaim our firm belief in the complete and inevitable revival of that prosperity, a belief founded on our own experience of the subject, and on the following reasons:—

1. As before stated, no Geneva watches are allowed to be sold except at a high standard of gold, which is a guarantee for their excellence and solidity; and though an inferior price may, for the time being, allure inexperienced buyers, still the inferiority in the goods always shows itself, and enhances the value of the superior watches; and this, in the end, brings the buyers to the best makers.

2. In what is called "bad years," Geneva will, proportionately, make more watches than Neuchâtel; for although its prices are twice as high, the superiority of them is always known; and it would be easy to prove by

\* The institution of the "warrants"—no other than the pawnbroking of goods—is now in Geneva entirely in the hands of usurers, for the following reasons:—Formerly the Geneva watchmakers had very few bills in circulation; but since the creation of the public banks this kind of transaction increased immensely, and became far too much for the means of those merchants and of the public banks themselves who encouraged these transactions, because they proved beneficial to them. Some bankers were beginning to lend money on the security of the warrants, but the very fact of resorting to this means of procuring money proving injurious to the merchants in the opinion of their bankers, affairs of this kind were soon done on a more secret footing, to avoid the discredit they entailed upon those who resorted to them, and money was procured by the warrants entirely from Jews, who lent it at a heavy per-cent-age. Another deplorable consequence of this system, besides the impossibility of answering demands for sale which it brought upon those who parted with most of their goods on such terms, has been to lower to an extreme degree the price of watches in Geneva, as, in cases where the goods were not duly redeemed, they have been sold at public auctions sometimes for less than half-price.

figures that Geneva finds market for its watches more easily than does Neuchâtel for its inferior goods. The consequence of this is that, at the greatest depression of the trade, Geneva suffers still less than Neuchâtel, and, consequently, preserves more strength and means to carry on the struggle against adverse circumstances.

The following is the number of watches turned out by Geneva in the last eleven years:—

In the year 1850 .....	.....	30,000	watches
" 1851 .....	.....	70,000	"
" 1852 .....	.....	70,000	"
" 1853 .....	.....	80,000	"
" 1854 .....	.....	80,000	"
" 1855 .....	.....	70,000	"
" 1856 .....	.....	70,000	"
" 1857 .....	.....	60,000	"
" 1858 .....	.....	60,000	"
" 1859 .....	.....	60,000	"
" 1860 .....	.....	40,000	"
" 1861 .....	.....	30,000	"
Total .....	.....	720,000	"

After all, a manufacturing city which has issued so many watches in a space of eleven years, is not quite paralyzed, and 720,000 are large figures. There seems every reason to hope that Geneva will rise again; for never, in its brightest days, has it issued more than 60,000 watches annually on an average. It will rise again, and more easily than may be expected by inexperienced judges, who are not aware of all the resources, perseverance, and elasticity of the working classes, with which a long experience has made the writer of this acquainted, and in which he is fully confident for the revival of this national industry as soon as external circumstances (which seem already less unfavourable) will allow fair play to the industrious workmen and the enterprising watchmakers.

**LAW ON TRADE MARKS.**—The Canton of Geneva has lately passed a law making it matter of prosecution to fraudulently use trade-marks of any kind, whatever may be the insignia adopted by a manufacturer. The adoption of a trade-mark is made optional; the owner to deposit two copies of such mark with the Tribunal de Commerce of Geneva, and the proprietorship of it to be good for fifteen years, with power of renewal on making a second deposit. This precaution seems to be necessary, otherwise the parties aggrieved will not be able to lay their complaint before the Tribunal; for Article III. says, "Nul ne peut revendiquer la propriété exclusive d'une marque s'il n'a déposé deux exemplaires du modèle de cette marque au Greffe du Tribunal de Commerce." The present law may be considered as resulting from the literary and artistic Convention concluded with France at the end of 1858, as the XIXth Article expressly says:—

"Les Etats Contractants ayant reconnu en outre l'utilité d'appliquer aux travaux de l'industrie la protection qu'ils octroient par la Convention actuelle à ceux de l'art et de l'esprit, considéreront désormais les marques de fabrique comme compris dans ces derniers, et en assimileront en conséquence la réproduction sous tous les rapports, à la contrefaçon artistique et littéraire.

"Les marques destinées à assurer la propriété industrielle des ressortissants de l'une ou de l'autre des Parties Contractantes seront disposés, en ce qui concerne l'industrie Genevoise, au greffe du Tribunal de Commerce de Paris, et en ce qui touche l'industrie Française, entre les mains de l'autorité Genevoise chargée par la loi de recevoir les dépôts semblables des industriels indigènes."

In the beginning of 1859, Geneva was willing to conclude a similar Convention with England, but, at the time it was not responded to. There can be no doubt that for our watchmakers, whose names are being constantly forged, not so much, perhaps, by Geneva as Neuchâtel, it would be very important to be able to lay hold of the offender before his own tribunals, and so

tend to put a stop to an evil of which our people loudly complain.

In order to comprehend the whole bearing of the law, I give it as it stands in the original:—

"*Loi sur les Marques de Fabrique*" (du 5 Avril, 1862).

"Article 1. La marque de fabrique ou de commerce est facultatif.

"Toutefois, la loi peut exceptionnellement la déclarer obligatoire pour les produits qu'elle détermine.

"Art. 2. Sont considérés comme marques de fabrique ou de commerce les noms sous une forme distinctive, les dénominations, emblèmes, empreintes, timbres, cachets, vignettes, reliefs, lettres, chiffres, enveloppes, et tous autres signes servant à distinguer les produits d'une fabrique ou les objets d'un commerce.

"Art. 3. Nul ne peut revendiquer la propriété exclusive d'une marque s'il n'a déposé deux exemplaires du modèle de cette marque au Greffe du Tribunal de Commerce.

"Art. 4. Le dépôt n'a effet que pour quinze années.

"La propriété de la marque peut toujours être conservée pour un nouveau terme de quinze années, au moyen d'un nouveau dépôt.

"Art. 5. Sont considérés comme coupable d'usurpation de marque de fabrique ou de commerce:—

"1. Ceux qui ont contrefait une marque ou fait usage d'une marque contrefaite;

"2. Ceux qui ont frauduleusement apposé sur les produits ou les objets de leur commerce une marque appartenant à autrui;

"3. Ceux qui ont sciemment vendu ou mis en vente un ou plusieurs produits revêtus d'une marque frauduleusement imitée ou portant des indications propres à tromper l'acheteur ou frauduleusement apposée.

"Art. 6. Peuvent être poursuivis comme coupables de la même usurpation:—

"1. Ceux qui, sans contrefaire une marque, en ont faite une imitation frauduleuse de nature à tromper l'acheteur, ou ont fait usage d'une marque frauduleusement imitée;

"2. Ceux qui ont fait usage d'une marque portant des indications propres à tromper l'acheteur sur la nature du produit.

"3. Ceux qui ont sciemment vendu ou mis en vente un ou plusieurs produits revêtus d'une marque frauduleusement imitée ou portant des indications propres à tromper l'acheteur sur la nature du produit.

"Celui qui intentera une action en vertu du présent Article devra prouver le dol ou l'intention frauduleuse du prévenu.

"Art. 7. Les délits d'usurpation de marque de fabrique ou de commerce seront, en ce qui concerne l'action correctionnelle, considérés comme des faits ayant pour but de tromper l'acheteur sur la nature de la chose vendue, et passibles des peines prévues à l'Article 423 du Code Pénal.

"Art. 8. Le Parquet ne poursuivra les faits relatifs à l'usurpation des marques de fabrique ou de commerce que sur la demande des intéressés.

"Art. 9. Les personnes dont la marque de fabrique ou de commerce aurait été usurpée peuvent réclamer la poursuite correctionnelle en adressant une plainte au Parquet, ou se pourvoir simplement devant les Tribunaux Civils, pour obtenir des dommages-intérêts proportionnés au tort qui leur a été causé."

#### BRITISH ASSOCIATION, NEWCASTLE, 1863.

##### ON THE RAILWAYS AND LOCOMOTIVES OF THE NORTHERN DISTRICT. BY JOHN FURNESS TONE, C.E.

The district comprised within the boundaries of the northern coal-field has been the seat of mining operations for the supply of the metropolis and the South of England from a period very remote as compared with the general opening out of the coal-fields of Wales and Derbyshire, and long ere the canals which were formed to connect the Midland coal-fields with their respective

markets were constructed, the produce of this coal-field was brought on tramroads to the Tyne, and there shipped.

Owing to the physical configuration of the coal-fields of Northumberland and Durham, the mines were situated for the most part at considerable altitudes above the river Tyne,—being placed, as it were, on the sides of the valley, thereby rendering the introduction and use of the canal system a matter of so much difficulty that notwithstanding its general adaptability to the cheap conveyance of heavy loads, the produce of our northern coal mines continued to be led to the banks of the river on these tramroads long after the general introduction of the canal system elsewhere.

The history of the progress of the railway system, like that of other great mechanical improvements, is a record of difficulties encountered, acting as a spur to invention, and eventually resulting in successful improvement; and it may fairly be said that to the necessities of the Newcastle coal trade the world is indebted for its railways.

The early tramroads seldom exceeded two or three miles in length; they were in use 260 years ago, and were constructed mostly of oak and beech timber; and of this last extensive woods are in existence in the upper portions of the county of Northumberland, planted apparently about 120 years ago, up to which period the demands for timber for these tramroads had not entirely ceased.

Wooden tramroads were in general use till about 1780, although cast iron rails were first used about 1770, but up to this time the use of cast iron rails still continues in some of the older private railways; these, however, are now almost always replaced with wrought iron as they are worn out, and may soon become matters of history.

The conversion of the wooden tramroads into iron ones was the first great step in the improvement of railways which (after the introduction of wrought iron rails in 1820) assumed their present shape, so far as the general principles of construction were concerned.

So completely has this country now been intersected with railways, public and private, that on an area of about 666 square miles, comprised in the northern coal-field, there are only 122 square miles, or about one-fifth of the whole, at a greater distance than one mile, and only 221 square miles, or one-third of the whole, at a greater distance than half-a-mile, from a railway, public or private.

The total length of the private railways in the entire district is 287 miles; the public railways constructed for the more immediate service of the district, and exclusive of main lines as under, comprise 387 miles; making together 674 miles.

The foregoing mileage of public railways is exclusive of those portions which have been constructed for more general purposes, and which, as before mentioned, have not both of their termini within the district, thus excluding from the calculation the main line from Darlington to Berwick, the Newcastle and Carlisle, South Durham and Lancashire, Border Counties and Wansbeck Railways.

The complete reticulation of the district by means of these railways will be understood from the circumstance that within the actual limits of the coal-field itself, comprising about 666 square miles, there are (including all lines general and local) 609 miles of railway, occupying about 6,000 acres of land, being nearly one mile of railway for each square mile of surface of the northern coal-field, in addition to the 1,300 miles of underground railway, as estimated by Messrs. Wood and Taylor, in their paper which has been already read on this occasion.

Previous to the introduction of tramroads, the old pack-horse conveyed 3 cwt., at three miles per hour, and travelled on an average about eight miles with his load.

The cost of this mode of conveyance was about 1½d. per cwt. per mile, or 30d. per ton per mile.

The introduction of macadamised roads increased the horse load from 3 cwt. to 18 cwt., and with the same mileage performed, the 30d. was reduced to 8½d. per ton per mile.

On the early wooden tramroads a horse averaged a load of two tons, further reducing the cost of haulage to 3½d. per ton per mile.

The immediate cost of actual haulage on private railways, exclusive of interest and capital on waggons as before, in cases where horses, inclines, and fixed engines are intermixed, as circumstances require, and with quantities varying from 80,000 to 160,000 tons per annum, is found to amount to 0·7d. per ton per mile.

The cost by leading with a locomotive engine, costing 38s. per day, and with a load of 126 tons net on the ordinary local railways of the North of England, and in gradients reaching up to 1 in 100, travelling with a load about thirty-five miles per day, exclusive also of interest of engine and railway, and of waggons as before, amounts to about 0·1d. per ton per mile.

And on first-class gradients, and under most favourable circumstances, with loads of 350 tons, a mileage of 60 payable miles, at a cost of 48s. per day, this haulage may possibly be reduced to 0·03d. per ton per mile, but this can but rarely be maintained in actual working.

Taking even 0·1 of a penny as being the cost of the mechanical effect required to lead a ton of coals on a railway by locomotives, we have reduced the cost to 1·300th part of that by pack-horses, and to 1·37th part of the cost of wooden tramroads.

In order, however, more fully to estimate the relative commercial value of the different modes of haulage, as practised in these northern coal-fields, it will be necessary to include the other elements of expense, such as interest of capital, maintenance, and the cost of the different descriptions of railway required in each case, and to compare the entire cost of the locomotive system with that of fixed engines and inclines, as practised extensively in these districts.

1st. By horses, fixed engines, and inclines intermixed, with traffics varying from 80,000 to 160,000 tons per annum, including waggons, maintenance and renewals (and with interest on cost of line at £1,500 per mile), the total expense of leading coals is found to amount to an average of 1·1d. per ton per mile.

This is exclusive of cost of land, or of way leaves paid in lieu thereof.

2nd. By fixed engines and inclines, without horse power, this expense, including as before, with a yearly traffic up to 400,000 tons, and a distance up to seven miles, the total cost amounts to 0·54d. per ton per mile.

The particulars of this mode of leading are as follows, viz.:—Engines, inclines, and maintenance of way, in all 0·43d. per ton per mile. Interest and cost of railways and plant, 5 per cent. per annum; rates and contingencies, exclusive of land, 0·11d. per ton per mile; making, as above, 0·54d. per ton per mile. By locomotives, and on railways of improved construction, including, as before, this cost with loads of about 126 tons, and with gradients up to 1 in 100, amounts on an average of railways to 0·44d. per ton per mile, as under, viz.:—The cost of maintaining and working a heavy locomotive engine, including repairs, coke, water, stores, wages, &c., amounts in one year, on an average, to £600; to this must be added interest on capital, viz., £2,300 at 5 per cent., £115, making the gross cost of an engine per annum £715, or say £720 per annum.

But to maintain three engines in working order on a railway, four must be kept, and this reduces the available number of working days to 234 throughout the year, costing 61s. for every day an engine works on the line, and travelling 35 payable miles with a load of about 120 to 130 tons, gives the locomotive power in conveyance of minerals at the rate of about 12 to 15 miles per hour, the sum of 0·17d. per ton per mile. To this must be added the cost of waggons, and interest thereon, amounting to 0·125d. per ton per mile; add interest, maintenance, and renewals of way, rates, &c., amounting in all to 0·222d. per ton per mile on a load of 800,000 tons; making the cost

of leading by locomotive power, with full employment, 0·517d. per ton per mile.

Thus it will be seen that the locomotive system, although capable of carrying a much greater mineral traffic, is not on the whole more economical than fixed engines and inclines, as now used in this district, unless in large traffic; indeed, where the traffic does not exceed 400,000 tons, and unless the gradients are 1 in 100, or better, the fixed engine has the advantage. As the gradients improve or deteriorate the locomotive gains or loses respectively, and at a million tons has a superiority.

The history of the rise and progress of the manufacture of locomotive engines especially connects itself with Newcastle-upon-Tyne. The large manufactoryes of Messrs. Stephenson and Hawthorn have for many years been, and continue to be, of the highest repute.

In 1825, Messrs. Stephenson turned out the first locomotive on the Stockton and Darlington Railway; and in 1829 completed the Rocket.

It is a remarkable circumstance that, notwithstanding the lapse of 34 years, during which the manufacture of locomotives has increased at a rate almost without precedent in similar matters, yet in the general principles of mechanical construction the present most improved locomotive remains very closely analogous to the Rocket.

The leading features of the Rocket were as follows:—Cylinder: diameter, 8in.; stroke, 14 in.; driving wheels, 4ft. 8in.; trailing wheels, 2ft. 10in.; heating surface, 144 square feet; weight of engine, 4 $\frac{1}{2}$  tons; weight of tender, 3 $\frac{1}{4}$  tons; horse power, 40; evaporating power, 18·24 cubic feet water per hour; coke, per cubic foot water evaporated, 11·7lbs.; maximum speed, 29 miles per hour; average speed, 13·8 miles per hour.

In the largest narrow gauge engines now constructed, the heating surface has been increased from 144 to 1,620 square feet, or 12 times that; the weight of an engine from 4 $\frac{1}{2}$  tons to 38 tons; the horse power from 40 to 1,300.

Since the commencement of the manufacture of locomotives, about 2,400 have been turned out by the manufacturers of Newcastle, and upwards of 900 of these have been sent abroad.

Taking an average cost of £2,000 from the commencement to this time, the gross value of the exported locomotives from Newcastle amounts to £1,800,000. Adding those manufactured for use in Great Britain and Ireland at £1,500, would give a further sum of £2,700,000; making the gross value of the locomotives from Newcastle to amount in all since the commencement of the manufacture to £4,500,000. Of the £4,500,000, nearly one-half is represented by material purchased by the manufacturers in various stages of completion; thus work to the value of upwards of £2,000,000 has been furnished by the manufacturers of Newcastle to the other branches of industry connected with their trade.

#### FINE ARTS APPLIED TO INDUSTRY.

In the Palais de l'Industrie, in the Champs Elysées, Paris, an Exhibition of the Fine Arts applied to industry has lately been opened. This remarkable Exhibition has been organised by a committee of private individuals, eminent in their industries, presided over by the Baron Taylor, member of the Institute, and Commander of the Legion of Honour, and is held in connection with *La Société des Inventeurs et des Artistes Industriels*, and authorised by the Minister of State. The Exhibition is open every day, on payment of twenty-five centimes (2 $\frac{1}{2}$ d.) on Sundays, of one franc on Saturdays, of half a franc on all other days; any surplus to be handed over to the *Société des Inventeurs*. The Committee, in their preface to the catalogue, call attention to the speech of the Emperor, made last January, on the occasion of the distribution of the medals awarded at the Exhibition of 1862. The Emperor said, "Individual exertion, working with

unflagging energy, renders it unnecessary for Government to be the sole promoter of the vital forces of a nation."

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Call into action the individual energy of each for all that is beautiful and useful. Such is your task." These pregnant words of the "crowned thinker," addressed to the *élite* of French workmen, say the Committee, have not been slow in bearing fruit, for without their influence the Committee feel assured that such a response to their appeal could not have been attained as the present exhibition shows, from so many men holding the first rank in Art Industries, as well as from artists of European reputation. The exhibition, as the offspring of individual enterprise, is itself a novelty in France, and a grand success. In it are shown for the first time, say the Committee, side by side, the vigorous productions of mature age and the attempts of youth, it may almost be said of infancy. As a preparation for the future, the organisers of the exhibition have invited the Schools of Design of Paris and the Departments to join in the Exhibition, and the Empress, to encourage the idea, has placed at the disposal of the jury, on the part of the Prince Imperial, five gold medals, as prizes for the students in these schools. Nearly fifty schools exhibit the work of their students. The building placed at the disposition of the Committee by the government affords ample space for a large number of exhibitors, who have taken advantage of the opportunity, and the Committee feel that such displays as these cannot fail to educate the public, the artist, and the workman, to appreciate the combinations of artistic genius and labour, and will thus lead on to a gradually improving future. The classification of the works shown is as follows:—

1. Architecture:—Plans, designs, materials formed by art and industry.
2. Statuary. Sculpture:—Marble, terra cotta, wax, alabaster, original bronzes, granite, porphyry, &c. Reduced figures modelled in plaster, after ancient and modern masters.
3. Ornamental Sculpture:—Mouldings, decorations for art industries.
4. Painting and drawing applied to decoration and art industries.
5. Paper hanging, embossed leather, &c.
6. Carpets, tapestry, and upholsterers' work.
7. Furniture of artistic character in various woods, carved or gilt, marquetry, mosaic, bronzes, lacquer ware, and new applications of iron.
8. Bronzes of artistic character for furniture, and for lamps. Imitation bronzed zinc; gilding on zinc. Artistic works in lead and copper. Artistic castings in iron. Artistic locksmiths' work.
9. Goldsmiths' work, jewellery, and works in silver gilt.
10. Painting on porcelain; enamels.
11. Ceramic:—Porcelain, china ornaments, &c.
12. Glass, mirrors, and windows.
13. Blinds; artificial flowers.
14. Church furniture and decorations.
15. Woven fabrics of every kind, for furniture, decoration, and domestic use, clothing, and the toilet, deriving their value from beauty of design and colour.
16. Fire arms, side arms, and cutlery.
17. Musical instruments.
18. Various industries, small pieces of furniture, shelving, *Articles de Paris*, dolls, &c.
19. Scientific industries:—Clocks, mechanical, optical, and geographical instruments, &c. Specimens of natural history.
20. Engraving on metals; ancient and modern methods. Letter engraving. Engraving on wood, lithography, chromo-lithography, autography, and heliographic engraving.
21. Photography.
22. Books and publications relating to the Fine Arts, their history and teaching by means of public buildings; archaeology, furniture, decoration, &c.

## PRINTING FOR THE BLIND.

The blind, of necessity, read by the touch. The method of printing in raised letters originated, as stated, with Valentin Hauy, in Paris, in 1784. Since then various kinds of embossed letters and characters have been adopted. The alphabetical systems are known as the Roman capitals, as in the books printed in the Glasgow and Pennsylvania institutions; the combined capital and lower case, as in books from the Bristol, Paris, and some of the German institutions; and the angular lower case, of the Massachusetts institution.

The arbitrary systems are known as Braille's in France; Carton's in Belgium; Lucas's, Frere's, and Moore's in England. Both systems have their peculiar advantages. While some institutions adopt the principle that the alphabets and all tangible apparatus should conform as nearly as possible to those universally in use by the seeing, it must be conceded that the simple arbitrary characters of Braille, Lucas, and others, are more readily learned by the adult blind and those whose touch has become less sensitive by work.

Books for the blind are quite limited in number and dear. Of the principal works of this character may be named—the whole Bible, printed at the Glasgow Asylum, in 19 volumes, quarto, £9 10s.; the whole Bible, in 8 large vols., price £4; a cyclopaedia, 8 large volumes (unfinished); Milton's Poetical Works, 2 volumes; Paley's Evidences, 1 volume; Combe on the Constitution of Man, 1 volume; Philosophy of Natural History, 1 volume; Rudiments of Natural Philosophy, 1 volume; Lardner's Universal History, 3 volumes; Common Prayer, 1 volume; Pope's and Diderot's Essays, 1 volume, and other works from the Boston Institution. A dictionary of the English language, 3 large volumes; Select Library, 5 volumes; Church Music, 3 volumes; Student's Magazine, 6 volumes, and other works from the Philadelphia Institution. History of the United States, 3 volumes, and several other works from the Virginia Institution. These and some volumes of moderate extent from the Bristol and London presses are all in the alphabetical type. The New Testament, and portions of it and part of the Old, have been printed and duplicated several times in the three arbitrary characters of Lucas, Frere, and Moore, used in England.

While these various arbitrary systems do credit to the ingenuity of the inventors, two of whom are blind, it is unfortunate, considering the paucity of embossed books, that the efforts of the friends of the blind have not been concentrated upon some one or two kinds of print.

The great object of all institutions for the education of the blind is to remove the disabilities under which they labour, as far as possible, by substituting the sense of touch for the lost sight; by a correct system of moral, mental, and physical training, and by giving them a knowledge of music or some useful mechanical art to prepare them for the active duties and enjoyments of life. Without deciding how their mental and physical condition will compare with the general standard, it is demonstrated that they have capacities for receiving a good education in the various departments of useful knowledge, and of becoming church organists and piano instructors. The largest number become practical workmen in several branches of plain handicraft. While the cultivation of music is to them a source of the greatest delight, and is almost universally taught to the younger blind as affording a benevolent compensation for the loss of all that is beautiful in nature, the exercise of the industrial powers supplies to the mass of the blind the great necessity of their condition. Occupation of mind and body in all these respects gives to the blind in the public institutions that tone of cheerfulness which is considered so remarkable in their condition.

But the great result is the preparation of the blind for self-support when they return to become members of the community. It is for this end that private bounty and legislative aid have been so generously granted in the United States. While the young blind are admitted for

a term of years to receive an education in the school and music departments, in connection with handicraft, adults at all ages under 50 are received in some of the institutions for a period of one or two years to acquire a simple trade, when they go on their way rejoicing in their ability to support themselves, or at least to remove the necessity of an entire and hopeless dependence on their friends or the public.

In Europe thousands of blind persons are paupers in the poor houses or burdens upon friends, who would be able, if instructed in simple trades, to earn a large part of their support. Many adult blind in the United States are in the same dependent condition. This number is being partially provided for by those institutions which receive adults.

The employment of the graduate blind by existing institutions is a subject of interest in the United States as in Europe. It is certain that many worthy and industrious blind persons fail to support themselves fully. How far and in what way they may be aided by existing institutions or by others organised for their welfare is an important question, claiming and receiving serious attention by those prepared to judge practically upon the subject.

## CASTOR-OIL.

The castor-oil plant has been known from the remotest ages. Caillard found the seeds of it in some Egyptian sarcophagi, supposed to have been at least 4,000 years old. Some people imagine it is the same plant that is called the *gourd* in Scripture. It was called *aporane* by the Greeks, and *ricinus* by the Romans. It is a native of India, where it sometimes grows to a considerable size, and lives several years. When cultivated in Great Britain, it is an annual, seldom exceeding three or four feet. There appears to be several varieties of the *ricinus*, the officinal or the *Ricinus communis*, or *Palma Christi*.

The seeds are oval, somewhat compressed, about four lines long, three lines broad, and a line and a half thick; externally they are pale grey, but marbled with yellowish brown spots and stripes.

The oil may be obtained from the seeds by expression, by boiling with water, or by the agency of alcohol. Nearly all that is consumed in England is obtained by expression.

In America the seeds cleansed from the dust and fragments of the capsules are admitted to a gentle heat, not greater than can be borne by the hand, which is intended to render the oil more liquid, and therefore more easily expressed. The whitish oily liquid thus obtained is boiled with a large quantity of water, and the impurities skimmed off as they rise to the surface. The water dissolves the mucilage and starch, and the albumen is coagulated by the heat, forming a layer between the oil and water. The clear oil is now removed, and boiled with a very small quantity of water, until aqueous vapour ceases to rise, and a small portion of the oil taken out in a phial remains perfectly transparent when cold. The effect of this operation is to clarify the oil, and to get rid of the volatile acid matter. Great care is necessary not to carry the heat too far, as the oil would thus acquire a brownish colour and acid taste.

In the West Indies the oil is obtained by decoction, but none of it appears in commerce in this country.

In Calcutta it is thus prepared:—The fruit is shelled by women; the seeds are crushed between rollers, then placed in hempen cloths, and pressed in the ordinary screw or hydraulic press. The oil thus obtained is afterwards heated with water in a tin boiler until the water boils, by which means the mucilage and albumen are separated. The oil is then strained through flannel and put into canisters.

Two principal kinds of castor seeds are known, the large and the small nut; the latter yields the most oil. The best East Indian castor-oil is sold in London as "cold drawn."

In some parts of Europe castor-oil has been extracted from the seeds by alcohol, but the process is more expensive, and yields an inferior article.

Castor oil is a viscid oil, generally of a pale yellow colour, a nauseous smell and taste. Its specific gravity, according to Saussure, is 0·969 at 53° Fah. The acid taste which it sometimes possesses may be removed from it by magnesia (Gerhardt.) At about 6° F. it forms a yellow, solid, transparent mass. By exposure to the air, it becomes rancid, thick, and at last dries up, forming a transparent varnish. It dissolves easily in its own volume of absolute alcohol; castor oil and alcohol exercise a mutual solvent power on each other. It is also soluble in ether.

There are chiefly three sorts of castor oil found in the London market; viz., the oil expressed in London from imported seeds, East Indian oil, and the American or United States castor oil. Castor oil is imported in casks, barrels, hogsheads, and dappers. It is purified by decantation and filtration, and bleached by exposure to sunlight.

It is not quite decided how many kinds of fats castor oil contains; according to Gerhardt several, but Saalmuller says only two. It is, however, principally composed of *ricinobine*, with perhaps a little stearine and palmitine, and an acid resin. Its ultimate composition is shown by the following analysis:—

Carbon	74·00	74·18	74·35
Hydrogen	10·29	11·03	11·35
Oxygen	15·71	14·79	14·30
	100·00	100·00	100·00

When castor-oil is heated in a retort to 500° F., an oleaginous liquid distils over, without the liberation of much gaseous matter; about the third part of the oil thus passes over. If after this it is further heated it froths up, but if the distillation is stopped before it begins to froth up, there remains in the retort a substance insoluble in water, alcohol, ether, the fatty and essential oils; this is treated with ether to remove any undecomposed castor-oil, then dissolved in potash; the soap thus formed yields a fatty acid, viscid at ordinary temperatures, very soluble in absolute alcohol, but little soluble in weak spirit. The volatile products of the distillation contained *ananthole*, *ananthylie acid*, some *acroebeine* and solid fatty acids.

Hyponitric acid solidifies castor-oil, and nitric acid when boiled with it converts it into ananthylie and suberic acids.

Castor-oil is said to be adulterated sometimes with croton oil to increase its activity; this is a dangerous sophistication. It is also mixed with some cheap fixed oils. The latter adulteration has been said to be detected by the solubility of castor-oil in alcohol, but unfortunately castor-oil may contain as much as 33 per cent. of another fixed oil, and yet be soluble in its own volume of alcohol, this oil possessing the property of rendering other oils soluble in spirit.

#### AMERICAN FIRE ARMS.

The Superintendent of the U.S. Census, in his preliminary report, states:—Our improved fire-arms, especially rifles and pistols, have obtained a reputation not alone in Europe, but in Africa, Asia, and the islands of the sea; the travellers find that new revolvers of American invention and manufacture exert a salutary influence on the Bedouin and the robber.

The machinery for making the various parts of rifles and other fire-arms, which, in its automatic exercise, seems almost endowed with reasoning faculties, owes its origin to the inventive genius of New England. The Enfield rifle was transplanted to England by a son of Vermont, under whose superintendence the arms were made. And even the Armstrong gun, which obtained for its reputed inventor the honour of knighthood, was invented in this country, for a model was submitted, and

the principle demonstrated, to scientific gentlemen at Harvard College, anterior to its appearance in Great Britain.

In the year preceding June 1, 1860, a year devoted to peaceful pursuits, the manufacture of fire-arms was limited, and yet two establishments in a single city of Connecticut produced to the value of over one million of dollars. Had the national inventory been taken two years later, the magnitude of this, and kindred branches of manufacture stimulated by the necessities of the country, would have excited astonishment.

The first rifles made by machinery to use the Minie ball, or its equivalent, were made at Hartford, Connecticut, and Windsor, Vermont, for the English Government. The machinery and tools for the armoury at Enfield (England), were made at Windsor, Vermont; Hartford, Connecticut; and Chicopee, Massachusetts. Robbins and Lawrence did most of the work on such machinery and tools, and James T. Ames, agent to the Chicopee works, got out the stocking machinery and some other parts.

#### ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

The report for July says, that during the month there have been examined 324 engines and 450 boilers. Of the latter, 17 have been examined specially, 11 internally, 55 thoroughly, and 367 externally; in addition to which 3 of these boilers have been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture, 8 (2 dangerous); corrosion, 16; safety-valves out of order, 9, (2 dangerous); water gauges ditto, 21; pressure gauges ditto, 8; blow-out apparatus ditto, 37; fusible plugs ditto, 2; furnaces cut of shape, 4; over pressure, 1 (dangerous); deficiency of water, 1 (dangerous); blistered plates, 3; Total 110 (6 dangerous). Boilers without glass water gauges, 2; without blow-out taps, 38; without back pressure valves, 41. The number of thorough examinations of boilers is steadily increasing.

One explosion during the month, of a very fatal character, by which ten persons were killed and four others injured, occurred to an ordinary mill boiler of the two-flue "Lancashire" class. This boiler was not under the inspection of the Association.

The dimensions were as follows:—Length 30 feet, diameter of the shell nearly 7 feet 6 inches, and that of the furnace tubes—which were parallel throughout, and not strengthened by any hoops or flanges—2 feet 8 inches; the thickness of the plates in the shell and tubes, seventeenth, in the flat end plates half an inch, each of them being strengthened with three gusset stays, secured with double angle irons.

The longitudinal seams in the shell were not laid in line, but disposed so as to break joint. The age of the boiler was about two years. It had not been tested by hydraulic pressure.

The boiler had been fitted with a single lever safety-valve, the valve being enclosed in a box bonneted over, from which the waste steam escaped through a discharged pipe, carried through the wall of the boiler house. It had also been fitted with a glass water gauge—a feed-check and back-pressure valve combined, fixed to the front end plate, a little below water level—a blow out or mud tap, and a steam pressure gauge, of the dial class; but the boiler had no tap for fixing an indicator, so as to check the accuracy of the gauge, and ascertain the actual working pressure with the steam up.

The boiler was rent into so many fragments by the explosion, that it was completely destroyed, while considerable damage was also done to the surrounding property. Both the furnace tubes were torn away from the end plates, as well as separated into two pieces, dividing at one of the transverse seams in the middle of their length. Three of these lengths, weighing upwards of a ton each,

were blown over a row of cottages, one alighting on the first floor of a dwelling beyond, having broken the roof in its fall, the other two lengths falling at intermediate distances between these two rows of buildings; while the fourth flew in a direction nearly at right angles with the others, and also fell upon a cottage, carrying in the roof. The safety-valve weight, which was a ball of about 8 inches diameter, was shot upwards, and, on its fall, broke through the roof of a third cottage. The shell of the boiler had been torn up into so many small pieces that it was difficult to trace the course of the rents, and to determine where they had first commenced; but it may be remarked, that one of them ran through the manhole, which was not strengthened as it should have been by a substantial mouth-piece.

The evidence given at the inquest, as well as the examination of the furnace-crowns, forbids the conclusion that the explosion was caused by a deficiency of water; while, further, the fact that the shell which should have been stronger than the tubes, rent into a number of small pieces while the tubes did not collapse, shows that the explosion was not due to excessive pressure, but to the defective quality of the plates of which the boiler, on examination, was found to have been made.

In conclusion, attention is specially called to the following points:—

The contradictory nature of the evidence too frequently admitted at coroners' inquests as to the cause of boiler explosions.

The short-sighted economy of purchasing low-priced boilers, erroneously termed "cheap," which leaves the maker no alternative but to use plates of an inferior quality, a practice not only detrimental to the interests of the steam user, but also unfair to the honest boiler maker.

The importance of having all boilers thoroughly tested with hydraulic pressure; this had never been done with the boiler under consideration; had the test been applied, there can be little doubt that the inferior quality of the plates would have been detected, and the explosion prevented.

The August report says, that during the month there have been examined 313 engines and 401 boilers. Of the latter, 6 have been examined specially, 9 internally, 45 thoroughly, and 341 externally, in addition to which 2 of these boilers have been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture 5 (1 dangerous); corrosion, 14; safety-valves out of order, 7; water-gauges ditto, 9 (1 dangerous); pressure gauges ditto, 15; feed apparatus ditto, 2; blow-out apparatus ditto, 27; fusible plugs ditto, 1; furnaces out of shape, 4 (1 dangerous); over-pressure, 3; deficiency of water, 1 (dangerous). Total, 88 (4 dangerous). Boilers without glass water gauges, 3; without blow-out apparatus, 16; without back pressure valves, 25.

Nine explosions have occurred during the month, from which five persons have been killed and three others injured. Not one of the boilers in question was under the inspection of the Association. In one case the boiler had been repaired with bolted patches. These, when necessary, should always be riveted on, as no reliance can be placed upon those merely bolted. At the time of the explosion there were three of these patches on the boiler, within 12 inches of one another. The surrounding plate at length became so eaten away by continual leakage, that it was reduced in places to one-eighth of an inch in thickness, and in others to that of a sheet of brown paper, from which rupture ensued underneath the boiler, at the back end, immediately over the midfeather; the midfeather, no doubt, accelerating the corrosion, by ponding the water, and holding it in contact with the plate, at the same time that it concealed the full extent of the injury. Competent inspection could not have failed to detect the dangerous condition of the boiler.

Considerable irregularity is met with in the manner in which many of the boilers under inspection are set. The external brickwork flues of some are so contracted as to be

altogether inaccessible, so that no examination of the plates can be made; of others, the side flues are of very unequal area, thus unfairly diverting the draught; of others, again, they are carried dangerously high, being considerably above the low water level; while in some cases longitudinal seams of rivets run right along the bearing surface of the brickwork seating, which not only accelerates corrosion of the plates, should leakage take place, but at the same time conceals the injury, so that it frequently goes on to a dangerous extent undetected.

## Home Correspondence.

### THE WHITWORTH RIFLE.

SIR,—It may be interesting to some of your readers to know that a wheel-lock gun, with the true Whitworth bore, bearing the undoubted date of 1636, may be seen at Mr. Soper's, a gunmaker of Reading.

It is evidently a single-handed gun, the butt being supported upon a projection or indentation of the breastplate or cuirass of the armour of that period. The stock is ebony, inlaid with gold, an elegant and expensive piece of workmanship, and the weapon has been in Mr. Soper's family time out of mind.

I am, &c.,

HENRY W. REVELEY.

Reading, October 21st.

## Proceedings of Institutions.

HULL YOUNG PEOPLE'S CHRISTIAN AND LITERARY INSTITUTE.—The report for last year congratulates the members that the income from subscriptions has exceeded that of any former year. The entire receipts from all sources have been considerably in excess of the general expenditure, and the Committee have been enabled to pay off about £40 of the debts of preceding years. There is still, however, a large sum which was owing when the Committee came into office, and which it is hoped the Institute will be enabled gradually to liquidate. The financial arrangements of the year have been conducted by a sub-committee, and it is recommended as a permanent regulation that this department be carried on by a similar committee, acting in conjunction with the officers. In order further to facilitate the business of this arrangement, the payment of half-yearly or yearly subscriptions is earnestly urged by the committee for adoption by the members, trusting that by a little effort and forethought the younger members will not experience any difficulty in the proposed change. The number of members is 1,250, viz.:—Honorary members, 310; ordinary members, 600; ordinary subscribers, 280; lady subscribers, 60. The different departments of the Institute are mostly in a very satisfactory state. The library contains 800 volumes, 150 of which have been added during the year. The special lecture arranged for by the Committee produced a nett receipt of £12, increasing the library to the extent of 100 volumes. The books circulate very largely, the issues having exceeded those of previous years. It is in contemplation to make still further efforts to provide the Institute with a library suitable to its wants. The Discussion Class has not—except during discussions of more than ordinary interest—been attended by large numbers. The Elocution and Reading Class, conducted upon the self-help and mutual improvement principles, has been of great benefit to its members. The Latin, German, French, and Phonetic Classes, are in full vigour under their respective teachers. The Bible Class has proved of high value to many of those who attend, holding on its even way, without any special characteristic. Attention is directed to the weekly *Journal of the Society of Arts*, containing, as it does, papers of great value, and much information of a scientific character. The annual excursion

of the Institute took place in July, when by the kindness of the Duke of Newcastle, Clumber House and grounds were thrown open to the members and friends. The excursion, besides being highly gratifying to all who accompanied it, was a source of pecuniary profit to the Institute. The Institute Cricket Club, formed for the exclusive use of the members, and under the management of a separate Committee, was vigorously carried on during the summer, and proved no inconsiderable adjunct to the Institute.

**LOCKWOOD MECHANICS' INSTITUTION.**—The eighteenth annual report for last year says that the state of affairs is unsatisfactory and discouraging. The number of members, the attendance in the classes, and the contributions are all considerably less than those of previous years; and this must continue to be the case until a new building be erected, which shall offer more inviting and comfortable accommodation to the young people of the district. The Committee still entertain the hope of being able to erect a new hall, suitable in all respects for the purposes of a Mechanics' Institution, and they rely upon the generous liberality of the large mill-owners and other employers of labour being exercised in furtherance of so desirable an object. The number of members at the end of the year was—males, 93; females, 26; total, 119. There are eight classes for males, taught by seven paid and two voluntary teachers, besides four classes for females, taught by three paid teachers, and one voluntary teacher. The number of books in the library is 576, and the issues during the past year have been 854 volumes. Special subscriptions, to the amount of £26 4s., have been collected by the Rev. T. B. Bensted, M.A., and Mr. Nathaniel Berry, and thus the Institution has been relieved from its somewhat embarrassed financial position. The expenditure has been £119 19s. 10*l*d., and there is a small balance due to the treasurer.

#### PATENT LAW AMENDMENT ACT.

##### APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, October 16th, 1863.]

Dated 10th July, 1863.

1725. T. Legg, Northampton-square, and R. Griffith, Exmouth-street—Imp. in the construction of sewing machines.

Dated 23rd July, 1863.

1869. R. Dawson, 16, Craven-street, Strand—An improved method of annihilating or extinguishing fires.

Dated 19th September, 1863.

2306. L. F. Chezand, 3, Rue des Capucins St. Jacques, and H. J. Christen, 6, Rue Neuve d'Orléans, Paris—Imp. in printing postage stamps, bankers' bills, shares, and other similar documents, and in machinery employed therein.

Dated 22nd September, 1863.

2334. G. M. de Bayet, 16, Stamford-street, and J. E. Pigouléte, 22, Pitt-street, Fitzroy-square—An improved method of compounding by agglomeration artificial fuel.

Dated 30th September, 1863.

2395. H. E. Skinner, Shadwell—A new kind of conical packing for taps.

Dated 1st October, 1863.

2405. F. Reid, Liverpool—Collecting or saving the spirit or alcohol generated by spontaneous fermentation in raw sugar, concrete, molasses, and molasses, and throwing off during the process of boiling or refining.

2407. W. E. Newton, 66, Chancery-lane—Improved apparatus for cleaning rice and other grain. (A com.)

2409. P. Leslie, M.D., M.R.C.S., 8, Windsor terrace, Eastbourne, Sussex—Imp. in preserving the bottoms of ships or vessels and other surfaces from the prejudicial effects of marine animals and vegetables.

Dated 2nd October, 1863.

2413. J. E. F. Ludeke, 2, Stonefield-street, Islington, and M. Fisher, 28, Rue Taitbout, Paris—Imp. in obtaining motive power.

2415. J. Tees, Glasgow—Imp. in packing for stuffing boxes and pistons.

2417. W. E. Gedge, 11, Wellington-street, Strand—An improved pen holder and feeder. (A com.)

2419. W. A. Torrey, 17, Water-street, Liverpool—Imp. in lubricating the axles of railway carriages. (A com.)

2421. G. Shepherd and W. T. Shepherd, Great Grimstby, Lincolnshire—Imp. in restoring the crystals of lump or refined sugar which has been divided by saws, and in apparatus employed for this purpose.

Dated 3rd October, 1863.

2423. J. Schofield, J. Kirk, and W. Spivey, Huddersfield—Imp. in looms for weaving.  
 2425. E. B. Wilson, 10, Strand—Imp. in the manufacture of iron and other metals and in the apparatus employed therein, parts of which are applicable for other purposes where high temperatures are employed, and also for ventilation.  
 2427. E. Pratt, Nottingham—Imp. in finishing woollen fabrics made on twist lace machinery.

Dated 5th October, 1863.

2429. W. Hoehl, C. Brakell, and W. Gunther, Oldham—Imp. in rotary engines worked by steam, water, or other motive power.  
 2431. J. M. Stanley and J. Stanley, Sheffield—Imp. in propelling.  
 2433. J. W. Guilmette, Manchester—An improved substitute for whiting, pipe clay, and other analogous substances to be employed to produce a white coating or surface.  
 2435. G. H. Ellis, Wellington-road, Bromley, Middlesex—Imp. in, and application of, apparatus for aiding the combustion of fuel.  
 2437. T. Ivory, Edinburgh—Imp. in steam engines and in furnaces and boilers for the same.  
 2439. R. Pepper, Saville-street, Sheffield—An improved machine for pressing or crushing spent hops.

Dated 6th October, 1863.

2441. S. Mathews, Birmingham—Imp. in breech-loading fire-arms.  
 2445. W. Batchelor, Finsbury-pavement—An improved apparatus for moulding and modelling palates, teeth, and gums for dental purposes.  
 2447. A. Johnston, Comely-bank, near Edinburgh—Imp. on railway carriages.

Dated 7th October, 1863.

2451. J. Caddick, Birmingham—Imp. in the manufacture of runners, runner notches, and top notches for umbrellas and parasols.  
 2453. C. P. Button, 27, Leadenhall-street—Imp. in lamps, especially applicable to the burning of hydro-carbons. (A com.)  
 2455. C. P. Button, 27, Leadenhall-street—Imp. in harrows. (A com.)  
 2457. A. Rigg, jun., George-street, Chester—Imp. in apparatus for propelling vessels.  
 2459. J. Gibson, Ryhope Colliery, Sunderland—Imp. in cast iron pit tubing.  
 2461. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the permanent way of railways. (A com.)

#### PATENTS SEALED.

[From Gazette, October 16th, 1863.]

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|--|---|
| 16th October.  | 1030. S. Harrison.  |
| 978. P. G. Rowell and H. Holt.                       | 1038. C. Beyer.   |
| 985. A. Ford and R. Rigg.                            | 1039. I. Dimock.  |
| 986. H. Rafter.                                      | 1039. W. Clark.   |
| 988. E. L. Simpson.                                  | 1105. S. J. Bartlett.   |
| 990. M. Runkel.                                      | 1111. J. M. Johnson, E. Johnson, C. Johnson, and L. Bertling. |
| 991. J. W. Nottinghamham.                            | 1113. G. Haseltine.   |
| 992. H. Yeaton, E. Yeaton, S. Yeaton, and J. Yeaton. | 1123. J. H. Knott.  |
| 996. W. Campion and G. Wilson.                       | 1126. S. B. Cochran.  |
| 997. W. Ryan and W. Daniel.                          | 1147. J. B. P. A. Thierry.                                    |
| 999. T. Settle.                                      | 1238. W. E. Newton.   |
| 1005. J. Lee and E. Dawson.                          | 1239. W. E. Newton.   |
| 1012. T. Richardson and J. C. Stevenson.             | 1327. W. E. Newton.   |
| 1014. J. Cavanah.                                    | 1369. A. V. Newton.   |
| 1015. J. B. Daines.                                  | 1420. J. G. Jones and R. Ridley.                              |
| 1016. W. N. Wilson & J. G. Grey.                     | 1650. F. Ransome.   |
| 1023. J. Thompson.                                   | 1807. F. J. Mavor.  |
| 1024. J. Thompson.                                   | 2059. T. Howard.  |
| 1028. C. Pooley.                                     | 2061. G. T. Bousfield.  |

#### PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, October 20th, 1863.]

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|----------------------|--|
| 12th October.        | 15th October.                                      |
| 2491. M. Strang.     | 2525. W. Henderson & J. Down.                      |
| 2496. R. A. Broaman. | 2528. W. Clarke and S. Butler.                     |
| 2497. M. Deavin.     | 16th October.                                      |
| 2651. W. T. Vose.    | 2538. T. J. Marshall.                              |
| 13th October.        | 2547. J. Macintosh.                                |
| 14th October.        | 17th October.                                      |
| 2503. G. Davies.     | 2552. J. Thompson, E. G. Fitton, and F. A. Fitton. |
| 2510. A. McDougall.  | 2553. J. Jack and D. Roilo.                        |
| 2514. P. R. Smith.   | 2555. C. Hoare.                                    |
| 2544. A. V. Newton.  | 2558. J. Burch.                                    |
| 2654. W. E. Newton.  | 2561. W. Jamieson, W. Robinson, and C. Rowbottom.  |
| 2676. C. Harratt.    |  |

#### PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, October 20th, 1863.]

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|----------------------|------------------------------|
| 12th October.        | 16th October.                |
| 2114. G. Collier.    | 2443. L. J. P. de Mirinonde. |
| 14th October.        | 17th October.                |
| 2462. H. Deacon.     | 2419. E. Tombs.              |
| 2494. L. A. Desachy. |                              |